

MEDICAL ADVANCES IN THE NEXT
TEN YEARS: THE IMPLICATIONS
FOR THE ORGANIZATION AND
ECONOMICS OF MEDICINE *

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To make sense of the next ten years in medicine, we must realize that the present has been served to us by the past hundred years. These were years that witnessed the ascendancy of the germ theory of disease and, more recently, the realization that many health problems can neither be explained by the germ theory nor be brought under control by methods that grew out of the germ theory.

It is a source of pride for physicians to regard the vanquishment of the epidemics that once ravaged our nation. But if we look closely we may wonder how much we had to do with what happened. Dubos¹ in 1949 reported the death rates from tuberculosis in Massachusetts for the previous hundred years. Starting from about the time of the Civil War, the decline in tuberculosis death rates was extremely regular; one can almost put a ruler on the curve. Where are the sudden increases in slope reflecting medicine's discoveries and advances? They are nowhere: the curve is so inexorable it almost seems to have moved in spite of us.

Of course, Dubos was viewing the situation on the eve of the introduction of isoniazid. That did make a difference. But by the time isoniazid appeared, the tuberculosis death rate in the city of New York had already declined from 688 to 15 per 100,000. As a matter of fact, three quarters of the decline in tuberculosis in the city since 1812 occurred before *any* rational treatment for the disease was available.

We do not know why some people in some situations are less apt to

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develop tuberculosis than others. We can invent a great many attractive theories as to why rates of deaths and new active cases are higher in poorer sections of a town, but we do not know the truth in scientific terms.

We know that tuberculosis is involved with society, with social situations, with living conditions, with poverty, and with areas of high unemployment and poor nutrition. We know that the years of the decline of tuberculosis were years in which social conditions were changing, the working day becoming shorter and real income rising. How much was accomplished by the doctors? How much was accomplished by the general improvement in living conditions? No one will ever know, I imagine, but the two were certainly entwined.

It seems to me that in the next ten years doctors will be drawn into deeper involvement in social change. The medical armamentarium by itself is not enough—not nearly enough—to bring about a real change in the trend of most of our major problems. As doctors, we shall find it necessary to deal with alterations in the fabric of our society and help improve some of the ways our people live.

Tuberculosis is undoubtedly a disease with an unusually high social component, tending to be much more of a problem in poor areas. Yet we cannot forget that poliomyelitis developed as a problem as living conditions improved and, to a large extent, because they improved. We cannot assume that what we accept as advances in our mode of living will act to push down health problems: witness the fact that conditions such as lung cancer, emphysema, and coronary heart disease are now increasing.

What we do in the next ten years will depend in part on the need (only in part, because we are never quite good enough to adapt fully). And that need will depend on the people, the medical problems, and the society with which we shall deal.

THE PEOPLE

The striking thing about the people we shall be dealing with is that there will be so many. Quite a few of us now living will see the United States population pass 400 million, which it is expected to do some time between the years 2000 and 2010.² We anticipate a population of 212 million by 1970 and 249 million by 1980. It is not expected that the number of new doctors will maintain the present

doctor-to-population ratio, so we shall be obliged to meet the needs of these numbers of people with proportionally fewer personnel in most health fields.

Furthermore, the population profile by age-groups is swelling at the ends. There are increasing numbers of persons 65 and older and, at the same time, a great increase in babies and children. Almost 25 million persons 65 and older are expected in the United States by 1980. In the city of New York there were 814,000 men and women 65 or older in 1960, and they have been increasing at the rate of about 20,000 a year. We expect to have one million older persons by 1970. Some of the characteristics of our aging population are well known and have been thoroughly studied. The elderly tend to have less health insurance than younger people, lower and fewer liquid assets, and less formal education.

The population of the coming decade will continue to be mobile. One person in five picks up and moves from one county to another in an average year. In the city of New York it is not unusual in some areas for a teacher to start with 30 children in her class in the fall and end with 30 in June—but they will be 30 different children. The interruption in the continuity of medical care through the moving of families is obvious.

There is a very real tendency for people who chose the suburb or the country while young to return to the city as they age. They cease to be the problem of the suburb, which may have accepted their taxes for many years and, if their resources become exhausted, they become the problem of the city, which has not had the benefit of their taxes. This is true not only of New York, which is so big, but of many other cities throughout the eastern states.

THE MEDICAL PROBLEMS

We can obtain a glimpse of the medical problems that will confront us in the future by examining the experience of the recent past. In Connecticut in 1900, for example, the five leading causes of death were:³ 1) pneumonia and influenza, 2) tuberculosis, 3) gastritis and enteritis, 4) diseases of the heart, and 5) nephritis and nephrosis. In 1962 the five leading causes were: 1) diseases of the heart, 2) malignant neoplasms, 3) vascular lesions affecting the central nervous system, 4) accidents and, 5) pneumonia and influenza.

The reasons for the reduction in the toll of infectious diseases is obvious. Although pneumonia and influenza are still on the list of 1962, we know they are largely a cause of death in the very old.

One significant trend, however, is not revealed by the simple listings. In 1900 the death rate in Connecticut from *each* of the five leading causes was between 102 and 239 per 100,000. But in 1962 the first leading cause of death, heart disease, claimed as many lives as the second two causes combined, and the first two causes resulted in more than twice as many deaths as causes 3 through 10 combined.

Today diseases of the heart, cancer, and vascular lesions affecting the central nervous system are overpowering causes of death, dwarfing all the others. They are all conditions whose increasing incidence our best efforts have not been able to halt. They are conditions for which we have no biologic cure. I realize that we have surgery and other methods that are effective in some individual cases of cancer; but they have not changed the impact of cancer as a cause of death. The pattern of incidence of cancer, moreover, suggests some gloomy portents. The experience we have had with cigarette smoking covers a period when most people did not smoke cigarettes. A man who is now 75, even if he is a heavy smoker, probably did not smoke cigarettes in any quantity before his late 20's, because cigarettes did not become really popular until after World War I. Women were still slower to adopt the habit, and even today they smoke less than men. We do not know what the result for the future will be if our population continues to begin smoking at early ages and to smoke at today's new high levels. It is certainly arguable that we shall experience a further, very sharp rise in lung cancer, contributing to the importance of that entry "malignant neoplasms" as the cause of death.

I think that in the next ten years we shall see a sharp focusing of the picture already visible. Although we are having a resurgence of tuberculosis and syphilis, I expect a decline in infectious disease as a cause of death, and a rise of diseases of the heart and cancer.

Mortality, of course, is only one part of the problem. Especially in our older people we shall deal with chronic conditions, and many old people will have more than one chronic condition. The National Health Survey for the fiscal year 1960⁴ lists the following chronic and disabling conditions as limiting the activities of those surveyed, starting with the most prevalent: 1) heart disease, 2) arthritis and rheumatism,

3) mental and nervous disorders, 4) high blood pressure (without heart involvement), 5) impairment of back and spine, 6) impairment of vision, 7) asthma or hay fever, 8) paralysis of extremities or trunk, 9) hernia, and 10) ulcer of stomach or duodenum.

There are a great many conditions on this list, and one should not assume, of course, that these ten constitute the bulk of the problem. For example, we have not even reached impairment of hearing, which is a substantial problem in older people, especially when combined with other problems. The presence of heart disease as the nation's greatest disabling condition is certainly contrary to any public image of it as generally swift and final.

More information comes from a study by the U.S. National Health Survey of people in the labor force during the year ending in June 1962.⁵ In the entire labor force, which begins with workers aged 17, only 48.1 per cent had no chronic condition; 51.9 per cent had one or more. While only 10.8 per cent of the labor force was held to have limitation of activity caused by a chronic condition (or conditions), one wonders if this would long continue to be true, and if these conditions were under treatment. The oldest age-group given in the data was 45-plus. In this group only 37.9 per cent had no chronic condition, while 62.1 had one or more. It would be interesting to have figures for a group 55 years old and over, or 65 and over.

It must be remembered that this study included only people *in* the labor force: about 71.3 million people. The other 100 million-plus were not included. To be in the labor force for purposes of this study one had to meet rather strict requirements, such as having looked for work within the 2 weeks preceding interview. Thus it was essentially a study of an active group.

It seems to me startling that in this group, from which enormous numbers of those with major chronic problems were excluded, there was still chronic disease in over half of those seen, and increasingly more as age increased. The amount of chronic disease in the total population must be very large. It is sure to increase in the next ten years and will constitute our largest medical problem.

THE SOCIETY

One could spend days looking into the society of the next ten years. I shall touch on it only briefly.

Our society will continue to concentrate in urban areas. In cities we find increasing numbers of people with low incomes, less and less able to pay for their own medical care. One half of all hospital and institutional care in the City of New York is paid by government, and one third of *all* patient care is paid by government.

In urban areas we find many older people living alone, especially in the central city. In some specific housing projects in the city of New York we have found more than half of the older tenants to be people living alone. Nearly one fifth of all human beings in the city live alone. I leave you to judge, against the background of mental illness—real and supposed—in older people, whether this aloneness is not in itself a pressure in the direction of ill health.

Society is intensifying pockets of poverty, where disease conditions are particularly acute. We had an increase of more than 10 per cent in tuberculosis last year in New York. Where? Mostly in run-down districts of the city, some right in its center, where people live in grinding poverty. The bacillus is not more potent in such areas, but the social conditions promoting sickness are.

The older citizens in our society are being ruthlessly discriminated against in employment. They are being pushed out of the mainstream of life—I believe with terrible impact on their physical and mental health. The late President Kennedy⁶ in a message to Congress in 1963 noted that the percentage of persons 65 and older in the labor force had been cut in half since 1940. Small wonder we have a problem. If the total number of people 65 and over soars, and the percentage able to get work continues declining toward the vanishing point, we are in for real trouble medically and socially.

In sum, our society is now creating the major health problems we shall confront in the future. As man has conquered infectious disease, perhaps more by an improvement in his standard of living than by specific therapy, he has had to pay a heavy price for the victory. The background of the health problems of our current and future age is increasingly man-made: our growing cigarette-smoking habituations, our alcohol-centered socializations, our drug-swallowing inclinations, our high-fat, high-calorie routine diets, our swift and dangerous motor cars, our smoke-belching factories, our heavily polluted waterways, our pesticide-dependent agriculture, our steadily increasing exposure to ionizing radiation.

THE NATURAL HISTORY OF DISEASE

It is useful to think of disease and of medicine's response to it in four stages:

1) *The stage of disease foundation and predisease factors.* Elements in this stage are the genetic heritage, environmental and family-cultural factors. For instance, is a child started on a diet high in saturated fats? Is cigarette smoking accepted, and thus promoted, in the family? The fat child as well as the heavily smoking, overeating, nonexercising adult are patients in the first stage of disease.

2) *The stage of presymptomatic disease.* Examples of this category might be certain kinds of precancerous lesions, asymptomatic cancer of the cervix, undetected, asymptomatic tuberculosis, high ocular tension prefiguring glaucoma. It seems to me likely, within the next 10 years, that prediabetic conditions also will be identifiable.

3) *The stage of onset of symptomatic disease.* This is the traditional province of medicine, the disease stage we and the public know best. A patient in third-stage disease gets a pain in his abdomen and goes to the hospital for appendectomy, which we are equipped to do beautifully. This is the stage of disease where the patient feels sick, comes to the doctor and says: "This is where it hurts." Medicine's response is to do something about it. This is the stage, too, where we woefully fragment our patient among dozens of organ-centered specialties.

4) *The stage of rehabilitation and the management of incurable conditions.* Let me give an example. A man has his leg injured, is taken to a hospital, and the leg is amputated. That is third-stage medicine. He is given an artificial leg, but nobody tells him how to use it, and it winds up hanging in a closet. That is unfulfilled, totally unacceptable fourth-stage medicine.

The fourth stage in the natural history of disease demands, in addition to treatment, concentration on the individual special problems and abilities. A professional football player with a mild case of rheumatoid arthritis will have much more of a total problem of adjustment than the man with a desk job who may have the same pathology. Fourth-stage medicine requires making the most of what the patient has, emphasizing his strengths, enabling him to function in spite of his disability; it should not, if possible, emphasize institutionalizing him.

It is fourth-stage medicine that our aged need so desperately to maintain their self-sufficiency, yet they are those who find it least available.

I have looked at the four stages in the natural history of disease as occurring over a man's full life; this is the way much chronic illness occurs. The four stages also can occur very quickly: a child is born with a defect of metabolism (stage 1) that is not detected promptly (stage 2); mental retardation results (stage 3), and the child may die without ever reaching stage 4, or may require stage-4 rehabilitation, perhaps unproductively, the rest of a long life.

Certainly we are better at handling the third stage of medicine than any other, but even here we begin to see difficulties. To illustrate, consider the eighth leading cause of death: lung cancer. We are unable, even in our best teaching hospitals, to save more than 1 in 15 lung-cancer cases through surgery (incidentally, this is very expensive surgery that ties up personnel who could be doing other jobs). How can we improve this record? There will certainly be advances in the surgery itself, but I see no hint of any development that would make this surgery effective enough to change the trend of lung cancer as a cause of death. We could, and should, improve our second-stage detection programs. Our surgeons would be very happy to get their lung-cancer patients earlier, and would achieve a better record if they did. Chest x rays of all who are admitted to hospitals should be routine. Despite the need for second-stage medicine and its programs, it is my feeling that the place for a major attack on lung cancer is in stage-one medicine. If we can keep children from taking up the cigarette smoking habit, we could eliminate lung cancer as a major health problem. By that I mean we could reduce it by at least 70 per cent or more, a vast improvement on our present surgical record.

In every instance possible, we should act on earlier stages of disease. We shall, of course, continue to see elderly patients with chronic disease. For these we must practice fourth-stage medicine; we shall find it necessary to be imaginative in doing what we can to maintain their self-sufficiency and prevent these conditions from becoming incapacitating. But for the more distant future, we can attempt to catch disease before it becomes chronic—better still, to prevent it. Maybe we can learn from Shakespeare's *Henry VI*, Part III:

A little fire is quickly trodden out;
Which, being suffered, rivers cannot quench.

I now propose to illustrate the change in the quality of medical care we can expect during the next decade by "The Parable of the Cut Finger." A 60-year-old woman once visited one of our best teaching hospitals to receive treatment for a badly gashed finger. She was seen immediately in the emergency room; the cut was washed, examined carefully for foreign materials, antiseptics were applied, the finger draped, Novocain injected, the lesion sutured, the wound appropriately bandaged. She was given a dose of tetanus toxoid and told to return in seven days for removal of the stitches. In 1964 this episode represents excellent medical care. I predict that by 1974 this will be an example of exceedingly inadequate medical care.

Had the physicians in the emergency room examined this lady more carefully they would have found that her eye glasses no longer were corrective for her presbyopia and that she actually required a much stronger plus lens. This would have been an application of fourth-stage medicine enormously meaningful to her total life; it might have helped prevent another episode of a cut finger.

Then, if they had examined our patient more thoroughly and performed a Pap smear they might have detected an early carcinoma of the cervix. Attention to this lesion would have been far more important in terms of the patient's total health than anything performed for the finger. This would have been an application of excellent second-stage medicine. Similarly, while the patient was waiting for attention, it could have been noticed that she was smoking steadily. Correction of this habit might have spared her from some of the more serious diseases to which she might fall heir at some future date. Had we been able to correct her smoking habit, we should have been practicing good first-stage medicine.

Medical care in the future will no longer limit itself to practice of third-stage clinical medicine. When the patient comes to our attention he must be considered as a total series of medical problems covering various stages of many different diseases. We can no longer afford, either financially or from the standpoint of health protection, to limit our attention to third-stage medical problems of one specific symptomatic disease. Medical histories will no longer begin with a "chief complaint" followed by a detailed discussion of the patient's history of his "present illness."

The organizational implications of this parable are enormous.

Patient-centered medicine bears so little resemblance to that which is disease- or organ-centered that our entire concepts of the organization of outpatient departments must be changed. The emergency room, which is fast becoming the most available day-or-night locus for medical care, could become the start of a true approach to thorough ambulatory patient care.

PRINCIPLES OF ADEQUATE MEDICAL CARE

I am now at the point where I might offer five principles of high-quality medical care.

1. *Comprehensiveness.* Comprehensive medical care is being rendered when each patient receives all the care he requires whenever he comes under medical attention. All the specialties and auxiliary medical skills he needs should become readily available to him. In hospitals, physicians' offices, and clinics the patient should be treated not only for his chief complaint and present illness but for all problems relating to the first, second, third, and fourth stages of other diseases from which he may be suffering. In medical practice the omission is most usually with respect to the first and second stages, and also, quite frequently, in the fourth or rehabilitative stage. We have attempted to illustrate this general principle with our parable of the cut finger.

2. *Continuity.* The principle of continuity means that, at best, the patient will have the same physician or team of physicians following him through the course of all his illness or, at least, that the same clinical record will be available to all of the physicians responsible for his care.

3. *Family-centered care.* Medical attention should be provided a family as a whole; today we tend to fragment the family before rendering care. This does not mean that particular specialists and special services will not be called upon; it does mean that physicians will work to coordinate all the efforts given a total family and, whenever possible, make it feasible for the family as a unit to come for medical care.

4. *Professional competency.* There is general agreement that professional competence is a prime element of quality of medical care: surgery should be performed by competent surgeons; obstetrics by qualified obstetricians; pediatrics by trained pediatricians. Whether or not we deal with certified specialties, only individuals competent to perform the particular medical procedure should do it.

5. *Community orientation.* Large medical centers will not be practicing high-quality medical care by future standards if care is limited to the kinds of individuals who now pass through their portals. The large number of people in the area who should be seeking such care and who do not, the large number who start under care and who drift away, and the large number of sick persons in the community, in various stages of diseases, who are not acceptable for treatment at these centers—all these must be considered. An adequate community medical-care program requires that there be excellent personnel manning excellent facilities and practicing the best scientific medicine for the treatment of narcotics addition, alcoholism, and all forms of chronic illness. It requires adequate home-care programs and programs to persuade patients who should be under medical care to seek it. It requires that a patient who is referred by one agency be followed to see that he does appear there. It requires the constant measurement of the total community problem of medical care in order to see what can be done to improve it.

The organizational implications of these principles of adequate medical care suggest, as did our parable, the need to integrate care around the patient and his family. The present system of fragmented specialty clinics may well end as the consulting background of a central family clinic. Such a family-centered program, especially if held in evening sessions, might be expected to attract many patients not now being seen at all and attract them at early stages of illness.

THE NEXT TEN YEARS

I was asked to talk about expectations for medical advances in the next ten years. I could say that we should find a cure for leukemia; that there may be improved drugs for the treatment of rheumatoid arthritis; that we shall learn to predict and perhaps prevent cerebrovascular accident. I could choose two infectious diseases such as hepatitis and rubella and predict that from some of the experiments now being made in tissue culture will come effective vaccines; that if this does not happen, we may have successful chemoprophylaxis.

But while we search for new miracles we must realize that we are not properly using the miracles we already have. We do need research in the laboratory. We do want new instrumentation and better surgery. But in the next 10 years we should try to learn how to bring the best

we know to everyone who needs it, and how to readjust our society so as to lessen its pressures toward sickness. I conclude with these points:

First, we need research particularly on stage-one medicine to build pressures for health and to build them early and strong. This is the most economical way of attacking the high cost of medical care, and it is the way most ignored. It is the one way, too, that sharply conflicts with significant aspects of our economy. Resolution of these conflicts poses a major challenge to our democratic society.

Second, we must be as concerned with the patient who does not come to us as with the one who does. The one who does not come may be an early case of cancer of the cervix; he may be in just such a condition for rehabilitative or minimal care to maintain self-sufficiency and prevent a long, costly terminal period of custodian care.

Third, we must count less on symptoms. Many of the patients for whom we can do most do not have symptoms.

Fourth, we must recognize that the cost of traditional, third-stage medicine is enormous and is increasing every day. Open-heart surgery and artificial kidneys come high. The future will no doubt bring even more costly techniques of elaborate care. This is an area of medicine to be used when needed, but we can do more to keep people from needing it.

Fifth, we must understand that institutionalizing our older patients with chronic disease is too costly to be considered a major line of attack. The slogan should be: keep them up, keep them active. We must extract them from the sea of enforced aloneness and enforced uselessness into which society has pushed them. We can make them feel useful by making them in fact useful. Let us hope that the expected large sums of money destined for care of the aged do not perpetuate the present emphasis on institutionalization or nursing-home incarceration, but emphasize ambulatory care near or in the patient's home—long before he becomes a "patient" in the current sense of the word.

Finally, the hospital contains the best medical people we have, but 95 per cent of all medical care takes place away from the hospital bed. We must spread the hospital and its talent around. The ambulatory patient is the prime target: keep him ambulatory, keep his family together, keep him going. What he needs is not short-term acute care

but continued supportive care. He needs this near his home in a family- and patient-centered clinic. Ambulatory care must be decentralized, brought near the home through branch clinics, store-front walk-ins, and easily available medical auxiliary services.

We shall find it necessary to be satisfied with less than a cure in many cases. We have almost passed out of the era when our legions marched into battle against disease with all flags flying. Still, there is much yet undone for patients with chronic disease. In many instances, through minimal health maintenance, we can keep them active and productive. But final and total victory over many health problems must wait for far more knowledge than we now possess. We are entering a period that is really a Cold War against these conditions. As such it will be new and probing, uncomfortable and unpredictable, difficult, controversial, and exciting.

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